

New records of *Limnonectes rhacodus* (Inger, Boeadi and Taufik, 1996) (Lissamphibia: Anura: Dicroglossidae) from Sarawak, East Malaysia (Northwestern Borneo)

Pui Yong Min^{1*}, Indraneil Das¹ and Alexander Haas²

¹ Institute of Biodiversity and Environmental Conservation, Universiti Malaysia Sarawak, 94300, Kota Samarahan, Sarawak, Malaysia.

² Biozentrum Grindel und Zoologisches Museum Hamburg, Martin-Luther-King-Platz 3, 20146 Hamburg, Germany.

* Corresponding author; E-mail: pui8783ibec@gmail.com

ABSTRACT: We comment on the termination of the species nomen of *Limnonectes rhacodus* (originally described as *Rana rhacoda*) and report the species from two separate localities in Sarawak State, East Malaysia, based on individuals collected from Kubah National Park, Matang Range and Gunung Penrissen, Padawan, both in western Borneo. The species was previously known from central, western, and southern Kalimantan, Indonesia. These records are the first for Malaysia and extend the distribution range ca. 220 and 264 km northwest of the nearest locality of Bukit Baka-Bukit Raya National Park (West Kalimatan) and increase the species' elevational range from 500 m to 1,120 m asl.

The Wrinkled Frog, *Limnonectes rhacodus*, was described as *Rana rhacoda* Inger, Boeadi and Taufik (1996), based on a series of female specimens (holotype: MZB 2991, paratypes: MZB 2992–94, FMNH 252417) from "Kalang River, Mentaya Hulu District, East Kotawaringin, Central Kalimantan, Indonesia (1°25' S/112°20' E)". Subsequently, the species has been recorded from Betung Kerihun and Bukit Baka-Bukit Raya National Parks (West Kalimatan); Murung Raya, Upper Barito River (Central Kalimatan); and Kahoil River (1°35'40" S; 115°30'30" E) (South Kalimantan) (Iskandar *et al.* 2011). Extant literature thus restricts the species to southwestern Borneo.

Although the species has been referred to as *Limnonectes rhacoda* (Frost 2013; AmphibiaWeb 2013), we herein amend the name to *L. rhacodus*, in gender agreement with the genus *Limnonectes*, following Article 30.1 of the ICBN (International Commission of Zoological Nomenclature 1999).

We present new records of *L. rhacodus* from further north, including a first record from Sarawak State, and a new national record for Malaysia. On 16 May 2012, during herpetofaunal surveys at Gunung Penrissen, Padawan, Sarawak; two adult specimens of *L. rhacodus* were collected from the bank of an unnamed slow-flowing stream, ca. 1 m wide, in highland mixed dipterocarp forest of the Batu Panggar region, below the summit of Gunung Penrissen (01°07'12" N, 110°12'35" E; 1,120 m asl; Figure 1). The specimens were ZMH A 11480, a female of 20.1 mm SVL (Figure 2) and ZMH A 11483, a male of 16.9 mm SVL. An additional specimen (ZMH A 11641; a male of SVL 15.5 mm; Figure 3) was collected on 9 August 2012 from lowland mixed dipterocarp forest along Belian Trail,

Kubah National Park, Matang Range, Sarawak (01°36'48" N, 110°11'45" E; 155 m asl). Surveys were carried out under a research permit (No. NCCD.907.4.4 Jld.7-39) issued by the Sarawak Forest Department. The specimens were euthanized, fixed in 10% formalin, preserved in 70% ethanol, and deposited in Biozentrum Grindel und Zoologisches Museum of Hamburg (ZMH) (export permit No.10143). In ZMH A 11480-11483, sex was determined by dissection, although males can be identified by the distinctly thickened base of the first finger, with a glandular patch along its ventral medial base.

Identification and allocation of the aforementioned specimens to *Limnonectes rhacodus* follow the diagnosis presented in the original description of the species by Inger *et al.* (1996): small body size (adult females reach 24 mm SVL); tips of toes swollen; webbing to distal subarticular tubercle of Toe IV; tympanum partially obscured by skin; an interrupted dorsolateral fold; no inverted V-shaped fold between shoulders; and skin between dorsolateral folds with numerous transverse wrinkles.

These records extend the distribution ca. 220 and 264 km to the northwest from the nearest known locality of Bukit Baka-Bukit Raya National Park to Gunung Penrissen and Kubah National Park, respectively (distances calculated using Esri®ArcMap™ 10.1). The highest known elevation of 500 m asl (IUCN 2012) is also increased to 1,120 m, based on our record from near the summit of Gunung Penrissen, Sarawak. We suggest that *Limnonectes rhacodus* may eventually prove to be widespread in suitable habitats across western Borneo, and may be extant in collections as misidentified *Occidozyga laevis*, with which it may be syntopic, and which it closely resembles.

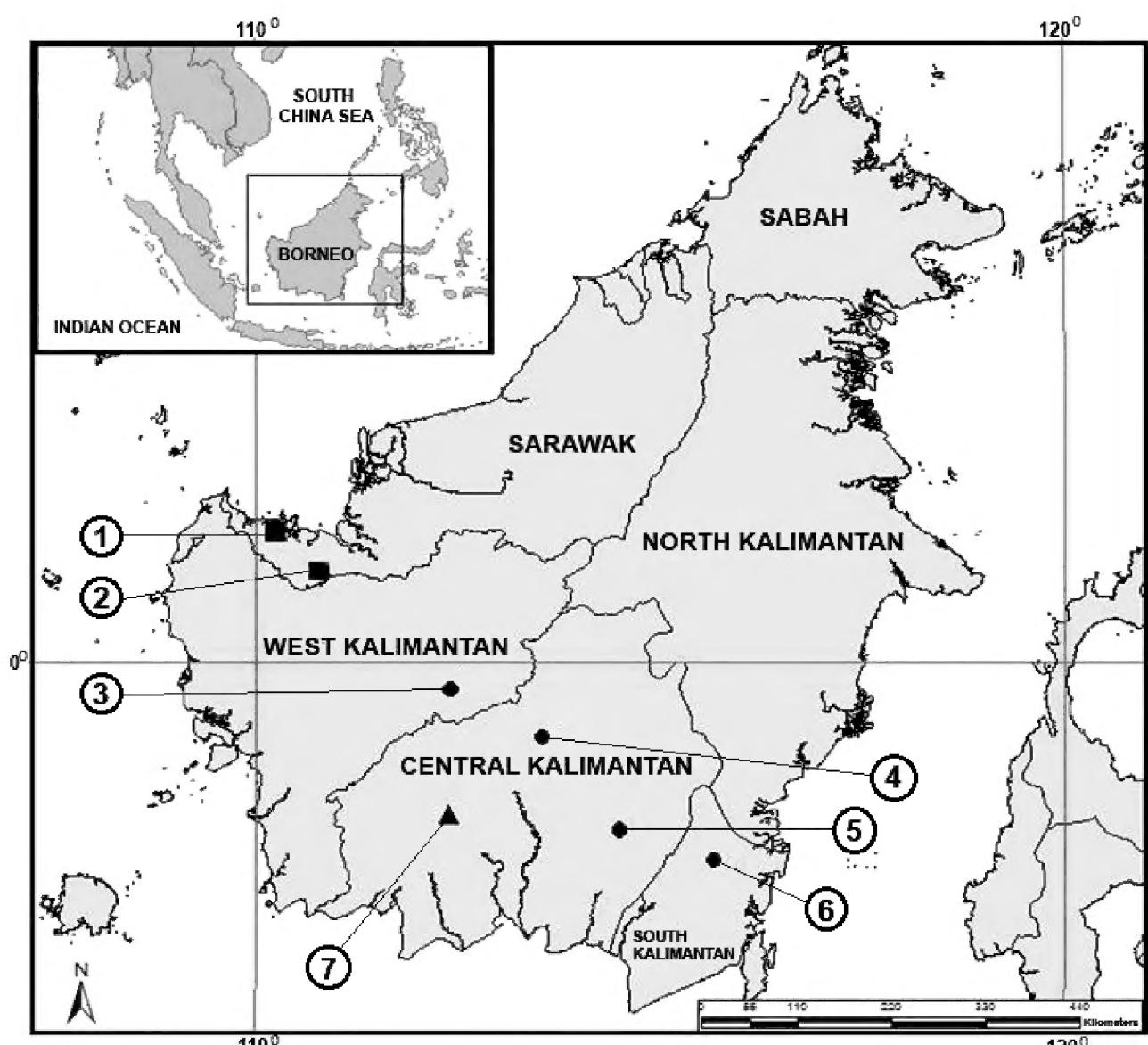


FIGURE 1. Geographic distribution of *Limnonectes rhacodus*. ■ = Current records (1, Kubah National Park; and 2, Gunung Penrissen), ● = Literature records (3, Bukit Baka-Bukit Raya National Park; 4, Betung Kerihun National Park; 5, Murung Raya, Upper Barito River; and 6, Kahoil River) and ▲ = Type locality (7, Kalang River, Mentaya Hulu District, East Kotawaringin).



FIGURE 2. *Limnonectes rhacodus* specimen from Gunung Penrissen, Sarawak State, Malaysia, Borneo (ZMH A 11840, female, SVL 20.1 mm).



FIGURE 3. *Limnonectes rhacodus* specimen from Kubah National Park, Sarawak State, Malaysia, Borneo (ZMH A 11641, male, SVL 15.5 mm).

ACKNOWLEDGMENTS: We thank the Institute of Biodiversity and Environmental Conservation, Universiti Malaysia Sarawak, and Biozentrum Grindel und Zoologisches Museum Hamburg, for supporting our field research. The Sarawak Forest Department permitted access to areas under its jurisdiction with a research permit. We thank Benard Tiang and his staff of the Borneo Highlands Hornbill Golf & Jungle Club for access to the Penrissen site, and Suziani binti Sulaiman and Dominic Jikau for support and advice during our long-term research at Kubah National Park. PYM's work on Gunung Penrissen was supported by a grant from Shell Chair, SRC/05/2010(01), ID and AH thank Volkswagen Stiftung grant 1/79 405 for supporting their work at the Kubah National Park. Finally, we thank Djoko Iskandar for sharing observations and Patrick David for nomenclatural advice.

LITERATURE CITED

- AmphibiaWeb. 2013. *AmphibiaWeb: Information on amphibian biology and conservation*. University of California, Berkeley, California. Accessible at <http://www.amphibiaweb.org/>. Captured on 11 June 2013.
- Fitzinger, L.J. 1843. *Systema Reptilium. Fasciculus Primus*. Wien: Braumüller et Seidel. 106 + vi + 3 p.
- Frost, D.R. 2013. *Amphibian Species of the World. Online Reference. Version 5.6*. The American Museum of Natural History, New York. Accessible at <http://research.amnh.org/herpetology/amphibia/index.php/>. Captured on 11 June 2013.
- Inger R.F., Boeadi and A. Taufik. 1996. New species of ranid frogs (Amphibia: Anura) from central Kalimantan, Borneo. *The Raffles Bulletin of Zoology* 44(2): 363-369.
- International Commission of Zoological Nomenclature (1999) *International Code of Zoological Nomenclature. Fourth edition*. London: The International Trust for Zoological Nomenclature. XXIX + 306 p. (in English and French)
- Iskandar, D.T., U. Arifin and Rachmansah, A. 2011. A new frog (Anura, Dicroididae), related to *Occidozyga semipalmata* Smith, 1927, from the eastern peninsula of Sulawesi, Indonesia. *The Raffles Bulletin of Zoology* 59(2): 219-228.
- IUCN 2012. *IUCN Red List of Threatened Species. Version 2012.2*. Electronic Database accessible at <http://www.iucnredlist.org/>. Captured on 20 May 2013.

RECEIVED: July 2013

ACCEPTED: October 2013

PUBLISHED ONLINE: December 2013

EDITORIAL RESPONSIBILITY: Ross MacCulloch